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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/626,494	DEVARAJAN ET AL.
	Examiner	**Art Unit**
	Daniel F. Hajnik	2628

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 2/12/2007.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,6-13,19-22,24,26,28,58-63,65-68,71 and 72* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,6-13,19-22,24,26,28,58-63,65-68,71 and 72* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 22 May 2006 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/12/2007 has been entered.

Specification

2. The disclosure is objected in accordance with 37 CFR 1.81 because of the following informalities: drawings appear in the specification on pages 54-57. Graphical illustrations, diagrammatic views, flowcharts, and diagrams in the descriptive portion of the specification do not come within the purview of 37 CFR 1.58(a), which permits tables, chemical and mathematical formulas in the specification in lieu of formal drawings. The specification, including any claims, may contain chemical formulas and mathematical equations, but must not contain drawings or flow diagrams.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 59, 65-68, and 71 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are in independent claim 1: "building a 3-D feature-based model based on the ordering ... to give a representation". For example, the preamble of the claim requires conversion of a 2D drawing to a <u>complete</u> three-dimensional model, however, the model cannot be complete in the claimed method steps because the model is never actually built. The specification states on page 19, in paragraph [066], "the present invention introduces an application to perform 2D to 3D conversions that will allow the user control in the creation of the 3D model" and states on pg. 22 in paragraph [075] "After the first two stages are complete, all features and their relationships to one another are available to begin building the 3D model. An initial step in the model creation process is to create a single tree (if possible) from the array of trees and their relationships". Thus, to convert from a two-dimensional drawing to a complete three-dimensional model requires creating and building the three-dimensional model.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 6, 7, 11-13, 19-22, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Balachander (NPL Document "Form Feature Extraction from 2-D Orthographic Views", herein referred to as "Balachander") in view of Gadh (US Patent 6,629,065) in further view of Jayaram et al. (US Patent 7,149,677 B2, herein referred to as "Jayaram").

As per claim 1, Balachander teaches the claimed:

building a plurality of features based on a feature class to give a plurality of built features, wherein the feature class comprises feature geometry, feature constraints, and feature dimensions *(towards middle of pg. 24, "Finally, the **isolated features previously recognized are classified** as protrusions and depressions **and stored in a feature database** as form features". Here, the features are built through extraction of the 2-D views. Further, the chart on pg. 56 shows the feature class, geometry, constraints, and dimensions. Further, the reference teaches of constraints for a cone (a feature), bottom of pg. 18);*

defining each built feature as a geometric representation of an individual feature type *(in the chart on pg. 56 of geometric representations of individual feature types such as Channel, Step, and Open Pocket);*

ordering the plurality of built features using geometry of up to six orthographic views of the built features *(bottom of page 33, "The feature* ***extraction from the root object*** *is performed in a series of steps as shown in Fig 5.8. ... Then features* ***are extracted*** *from the primary loop* ***of each view*** *based on the presence of certain characteristic patterns which satisfy positional and dimensional constraints. Only through features are extracted from the primary loop. The drawing files are updated after this step. More features are extracted from the root object in the next step ..." and towards middle of pg. 49, "In order to classify the* ***features*** *as protrusions and depressions we consider the feature loops together* ***with the enclosure relationships****". Here, pg. 49 shows a loop hierarchy. Further, the loops are associated with features. Based on the hierarchy shown, there is an order inherent to the build features as shown in the graph in figure 5.21 on page 49. Further, Figure 2.1 (pg. 9) also shows a build feature hierarchy with built features. In addition, Balachander teaches of 3 orthographic views (which is less than 6 views), i.e. on the top of page 34, "The presence of the feature is confirmed* ***if*** *certain* ***characteristic patterns*** *which satisfy positional and dimensional constraints* ***exist in the other two views****")*;

Balachander does not explicitly teach remaining claim limitations.

Gadh teaches the claimed:

building a 3-D feature-based model based on the ordering of the plurality of built features to give a representation *(col 35, lines 61-63, "Some examples of shapes modeled by VDSF are shown in FIGS. 32 through 53 to illustrate the effects of* ***VDSF's dual graph representation****" and in figures 35-39, where each of these figures shows an order through graphs in which is which the 3-D shapes are built or modeled).*

It would have been obvious to one of ordinary skill in the art at the time of invention to combine Balachander and Gadh. Gadh offers one advantage to the combination *(in the abstract, "The underlying geometric representation of the objects within the design tool is optimized so that design activities such as modeling, editing, rendering, etc. can be processed extremely rapidly, thereby enhancing the response time of the design tool")* where this rapid modeling and rendering can allow the user to correct any mistakes in real-time in a CAD model conversion process.

Jayaram teaches the claimed:

storing the representation in an intermediate binary file format *(col 16, lines 40-41, "the extracted data is stored in a designated metafile format* ***(an intermediate file format)****" and col 14, lines 47-50, "First, there is a source to Applicant's model format (an intermediate format) conversion. Secondly, there is Applicant's model to target file conversion". Further, using a binary formatted file is obvious because it is one of the most well recognized and efficient methods for storing computer related information in an organized manner).*

It would have been obvious to one of ordinary skill in the art at the time of invention to combine Balachander, Gadh, and Jayaram. Jayaram offers one advantage to the combination *(col 3, lines 4-9, "One advantage of the present invention is to provide a novel method and apparatus for computer aided design file translation having a geometric analyzer for CAD file comparison which determines if a translated CAD file (the output, created by the translation) is geometrically identical to the original source CAD file from which it was translated")* where this CAD file translation process is achieved through the use of an intermediate file format.

As per claims 6, Balachander teaches the claimed:

6. The method of claim 1, wherein the intermediate binary file format comprises a geometry library (*top of page 26, "For every arc (semi-circle, quarter circle) in the entity database lines ... are generated and* ***stored in the line entity database****" where these geometry features are stored in a library or database")* and a feature library *(page 54, section 5.4.5, "The Feature Database" where the library can be the database)* adapted to build the three-dimensional model.

As per claim 7, Balachander teaches the claimed:

7. The method of claim 6, wherein the geometry library comprises geometry classes for: two-dimensional entities; three-dimensional entities- line; arc; elliptical arc; polyline; spline; face; points; and vectors *(bottom of page 25, "The information about different* ***entities like lines, arcs, and circles*** *are stored in separate files" and top of page 26, "For every arc (semi-circle, quarter circle) in the entity database lines ... are generated and* ***stored in the line entity***

database", *where lines are two-dimensional entities and vectors, and figure 5.23 which shows 3D dimensional geometry)*.

As per claim 11, Balachander teaches the claimed:

11. The method of claim 1 further comprising independently defining each feature via a three-dimensional coordinate system *(page 35, towards top, "1. The line entity whose end-point has the least* ***X, Y, or Z co-coordinates*** *is chosen as the seed entity for tracing out the primary loop. This end-point is denoted as the starting point" and in figure 5.18 on page 46 which shows that this tracing is directly related to defining features where the three-dimensional coordinate system is in X, Y, and Z coordinates)*.

As per claim 12, Balachander teaches the claimed:

12. The method of claim 11, wherein the three-dimensional coordinate system contains the data necessary to detect <u>at least one</u> of a following element <u>from a group</u> consisting of:

<u>a work plane</u>; a sketch plane; and <u>a face upon which a feature may need to be built</u> *(in figure 5.18 on page 46, where the tracing in Loop 3 is a face upon which a feature is to be built, for example figure 5.23 shows where a Cylinder is built upon the face in Loop 3 where Loop 3 is defined using three-dimensional coordinate space coordinates)*.

As per claim 13, Balachander teaches the claimed:

13. The method of claim 12, wherein the data comprises at least one of a following element from a group consisting of:

plane vectors an origin of the plane; and <u>an elevation of the plane</u> from a world origin *(on page 55, in figure 5.23, where one plane is defined as being elevated above the ground, this plane is the top of the object where the Cylinder rests upon", further fig 6.3 on page 64 shows the elevation of this plane as well on the "front View" and the "Side View").*

As per claim 19, Balachander does not explicitly teach the claimed limitations.

Gadh teaches the claimed:

19. The method of claim 1, wherein the feature constraints are handled via a class that provides <u>at least one</u> of a following action from a group consisting of:

defining <u>a constraint type</u>, a constraint data value, and <u>a constraint object</u> *(col 10, lines 39-42, "(3) any user-specified or system-specified design **constraints on the elements** or their relationships (e.g., two elements are to be spaced apart by some specified distance, etc").*

indicating if the constraint is to an edge or to a point, and a definition of the edge or the point, wherein the indicating is based on a constraint object type *(col 13, lines 48-50, "FIG. 14 illustrates an example of a violation of **an explicit constraint** (design rule) provided in VDSF (**distance between elements** does not meet user-specified standard)" where this distance constraint can be measured against an edge, also see figure 14 where the distance d is measured against an edge r_3).*

It would have been obvious to one of ordinary skill in the art to use these features with Balachander in order to enforce distance type constraints in the building process as taught by Gadh where these constraints can improve the quality of the models constructed.

As per claim 20, Balachander teaches the claimed:

20. The method of claim 1, wherein the intermediate binary file format may contain stored two-dimensional input views via a class *(in figure 6.3 on page 64 where two-dimensional views are shown and where these views are be incorporated into an intermediate binary file format).*

As per claim 21, Balachander teaches the claimed:

21. The method of claim 20, wherein each view class contains at least one of a following element from a group consisting of:

a coordinate system associated with the view *(in figure 6.3 on page 64 where each view has a coordinate system shown associated with it).*

As per claims 22 and 24, Balachander does not teach the claimed limitations.

Jayaram teaches the claimed:

22. The method of claim 1, further comprising transferring system specific data through an intermediate binary file based on the ordering of the built features and

24. The method of claim 1 further comprising transferring application specific data through an intermediate binary file based on the ordering of the built features *(col 14, line 66 – col 15, line 2, "In order to facilitate the process of converting from a source file format to Applicant's formats and from Applicant's formats to a target file format, **several CAD system specific utilities were developed**" and col 15, lines 8-11, "**determining specific geometric data** that is not necessarily provided by the source CAD system, **but will be needed in order to generate** the*

*equivalent geometry **with the target CAD system**" where this specific data can include system specific data and application specific data).*

It would have been obvious to one of ordinary skill in the art to use the claimed features with Balachander. The motivation of claim 1 is incorporated herein.

3. Claims 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Balachander in view of Gadh (US Patent 6,629,065) in further view of Jayaram et al. (US Patent 7,149,677 B2, herein referred to as "Jayaram") in further view of Dale (NPL Doc "C++ Plus Data Structures").

As per claim 8, Balachander does not explicitly teach the claimed limitations.

Dale teaches the claimed:

8. The method of claim 7 further comprising copying data between at least one of the class's private data space and an address of the data specified from a calling function *(pg. 344, "Copy Function", pg. 345, "However, **Copy** does have access to the **private data members** of its parameters" where a call function is shown towards the middle of page 344).*

It would have been obvious to one of ordinary skill in the art to combine Balachander, Gadh, Jayaram, and Dale in order to utilize well-proven and efficient methods of coding with private data spaces and calling functions as taught by Dale.

As per claim 9, Balachander does not explicitly teach the claimed limitations.

Dale teaches the claimed:

9. The method of claim 8 further comprising, within each class, classifying the data as <u>at least one</u> of a following classification from a group consisting of: <u>fundamental data</u>; and <u>derived data</u> *(pg. 363 towards top, "**Base class** The class being inherited from" and "**Derived Class** The class that inherits" where the base class is a fundamental data class).*

It would have been obvious to one of ordinary skill in the art to use the claimed feature with Balachander in order to utilize well-proven and efficient methods of object-oriented programming in order to organize the data better.

As per claim 10, Balachander does not explicitly teach the claimed limitations.

Dale teaches the claimed:

10. The method of claim 9 further comprising ensuring, by each of the classes, that any change made to the fundamental data via a function will update the derived data accordingly *(top of page 363, "The **derived class inherits** all the properties of **its base class.** In particular, the **data and operations defined** for the base class **are now derived** for the derived class" where an update to the base class or fundamental data class with update through inheritance to the derived data class as well").*

It would have been obvious to one of ordinary skill in the art to use the claimed feature with Balachander. The motivation of claim 9 is incorporated herein.

4. Claims 26 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Balachander in view of Gadh (US Patent 6,629,065) in further view of Jayaram et al. (US Patent

7,149,677 B2, herein referred to as "Jayaram") in further view of Morgenstern (US Patent 5,970,490).

As per claim 26, Balachander does not explicitly teach the claimed:

Morgenstern teaches the claimed:

26. The method of claim 1, wherein the intermediate binary file format is a binary file of individual features and metadata associated with each feature is created by serializing object data structures of individual features and associated metadata *(col 29, lines 31-37, "**Structured files** are common as the import and export media of commercial design tools. There are two types of uniform regions for structured files: ASCII and **binary regions**. ... A **binary region consists of** values which are 8-bit data (which **includes control characters**). Both ASCII and binary uniform regions **are processed sequentially from left to right**" where these binary regions and control characters can have metadata to help organize the data and where sequential processing can be serial processing)*.

It would have been obvious to one of ordinary skill in the art to combine Balachander, Gadh, Jayaram, and Morgenstern in order to utilize the well-proven and efficient method of read and writing computer data where this format has wide spread compatibility and flexibility with many existing computer systems.

As per claim 28, Balachander does not explicitly teach the claimed:

Morgenstern teaches the claimed:

28. The method of claim 1, wherein the binary file format can be incrementally updated.

(col 29, lines 36-39, "A binary region consists of values which are 8-bit data (which includes control characters). Both ASCII and ***binary*** *uniform* ***regions*** *are* ***processed sequentially*** *from left to right by the respective type of parser object instance" where this sequentially processing can be incremental updating).*

It would have been obvious to one of ordinary skill in the art to use the claimed feature with Balachander. The motivation of claim 26 is incorporated herein.

5. Claims 58 and 65-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Balachander in view of Hazama et al. (US Patent 6212441, herein referred to as "Hazama") in further view of Jayaram et al. (US Patent 7,149,677 B2, herein referred to as "Jayaram").

As per claim 58, Balachander teaches the claimed:

Balachander teaches the claimed:

(a) inputting the two-dimensional drawing *(towards bottom of pg. 24, "the input to the system will be in a neutral file format. The file format used here is the DXF format. The 2-D drawings from most CAD packages can be obtained in the DXF format");*

(c) using an automated feature detection system to create matched feature loops *(towards top of pg. 24, "The complex task of* ***feature recognition*** *and extraction is broken down into many sub-tasks which are performed in a certain sequence. Our intent is* ***to automate the process*** *as much as possible" and first box in flow chart on pg. 62 "Find_featureloops()");*

(d) performing a profile analysis and a feature analysis on the matched feature loops *(towards top of pg. 18, "**The recognition of 3-D geometric entities like cones, spheres and parallelepipeds from 2-D orthographic views** is made possible by using a constraint based method" and towards top of pg. 48, "The next step is to find the hierarchical relationship between the loops as follows:" where according to figure 5.19 determining such a relationship involves analysis of each of features in each of the profile views as shown).*

(e) producing an ordered list of three-dimensional features using geometry of up to six orthographic views of the three-dimensional features *(bottom of page 33, "features are extracted from the primary loop **of each view** based on the presence of certain characteristic patterns" and towards middle of pg. 49, "In order to classify the features as protrusions and depressions we consider the feature loops together with the **enclosure relationships**". Here, pg. 49 shows a loop hierarchy. Further, the loops are associated with features. Based on the hierarchy shown, there is an order inherent to the build features as shown in the graph in figure 5.21 on page 49. Further, Figure 2.1 (pg. 9) also shows a build feature hierarchy with built features. In addition, Balachander teaches of 3 orthographic views (which is less than 6 views), i.e. on the top of page 34, "The presence of the feature is confirmed if certain characteristic patterns which satisfy positional and dimensional constraints **exist in the other two views**")*;

Balachander does not explicitly teach the remaining claim limitations.

Balachander suggests the claimed:

A method for converting a two-dimensional drawing to a complete three-dimensional model, as an output that is readable and editable in a 3-D computer-aided-design ("CAD") software system *(towards top of pg. 18, "The recognition of 3-D geometric entities like cones, spheres and parallelepipeds from 2-D orthographic views is made possible by using a constraint based method. The constraints which would need to be satisfied for the presence of a 3-D entity is developed as follow" and towards bottom of pg. 15, "Although very limited work directly pertaining to feature recognition from 2D drawings has been done it is interesting and appropriate to look at done in a related field. This field is the conversion of 2D CAD data to a 3D CAD format").* It would have been obvious to one of ordinary skill in the art to output the complete 3D CAD formatted file in order to produce a 3D formatted file that works with 3D software, as opposed to an incomplete model that would not immediately be useful.

Hazama teaches the claimed:

(b) correcting errors associated with the two-dimensional drawing to give a corrected two dimensional drawing *(figure 13, step S.162 "2D Clean Up").*

It would have been obvious to one of ordinary skill in the art at the time of invention to combine Balachander and Hazama. Hazama teaches one advantage of the combination *(col 58, lines 7-10, "When developing the 3-D model at step S.168, an additional clean-up process may be included in order to further process and refine the resultant 3-D model" where Balachander would benefit from the added functionality through better prepared and useful 2D drawings).*

Jayaram teaches the claimed:

(f) writing the ordered list of three-dimensional features to an intermediate binary file format *(col 16, lines 40-41, "the extracted data is stored in a designated metafile format (an intermediate file format)" and col 14, lines 47-50, "First, there is a source to Applicant's model format (an intermediate format) conversion. Secondly, there is Applicant's model to target file conversion". Further, using a binary formatted file is obvious because it is one of the most well recognized and efficient methods for storing computer related information in an organized manner).*

It would have been obvious to one of ordinary skill in the art at the time of invention to combine Balachander, Hazama, and Jayaram. Jayaram offers one advantage to the combination *(col 3, lines 4-9, "One advantage of the present invention is to provide a novel method and apparatus for computer aided design file translation having a geometric analyzer for CAD file comparison which determines if a translated CAD file (the output, created by the translation) is geometrically identical to the original source CAD file from which it was translated")* where this CAD file translation process is achieved through the use of an intermediate file format.

As per claim 65, Balachander teaches the claimed:

automatically splitting entities in the drawing or in the corrected drawing corresponding to top, front and side views *(In figure 5.19 on pg. 47).*

Balachander does not explicitly teach any of the remaining claim limitations.

Hazama teaches the claimed:

automatically filtering non-graphical entities *(in col 52, lines 53-58 by teaching of detecting and eliminating text (non-graphical) features for the 2-D drawings).*

performing error checking on the drawing and

if errors are found, correcting the errors;

(col 58, lines 20-24, "As such, according to an aspect of the invention, the 3-D clean-up process ***may include processes and operations for detecting and removing one sided open lines and for detecting and cleaning bendlines and trimming faces****". Here, the 3-D clean-up process is checking for errors and correcting any if needed).*

Hazama suggests the claimed:

exploding any blocks in the drawing to accumulate indivisible geometric entities *(By teaching of in figure 14A, step S.192 of detecting inside loops, holes, and shapes).* It would have been obvious to one of ordinary skill in the art at the time of invention to use the claimed feature because exploded views provide an excellent way to perform analysis on inside loops, holes, and shapes by spreading apart the pieces. One advantage for utilizing the claimed feature is to more quickly and accurately process the shape data for analysis.

It would have been obvious to one of ordinary skill in the art to use the claimed features with Balachander. The motivation of claim 58 is incorporated herein.

As per claims 66-68, Balachander teaches the claimed:

66. The method of claim 65 further comprising fixing a common origin for each view and

67. The method of claim 66 further comprising translating the entities to the common origin and

68. The method of claim 67 further comprising writing the translated geometric entity data to classes *(towards top of pg. 26, "The co-ordinates of the start and end points of the lines, arcs, and circles* ***are normalized with respect to a common origin"*** *and towards bottom of pg. 56 "We have* ***considered extraction of features whose axes are either parallel or perpendicular to one of the three principal planes"****. Here, the three principal planes can be aligned to form a common origin and the extraction is performed by using the views. Further, the chart on the top of pg. 56 shows root object features being organized into a translational class).*

6. Claims 59-63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Balachander in view of Hazama et al. (US Patent 6212441, herein referred to as "Hazama") in further view of Jayaram et al. (US Patent 7,149,677 B2, herein referred to as "Jayaram") in further view of Morgenstern (US Patent 5,970,490).

As per claim 59, Balachander does not explicitly teach the claim limitations.

Morgenstern teaches the claimed:

59. The method of claim 58 further comprising interfacing the binary file format to a binary file system *(col 29, lines 31-37, "****Structured files*** *are common as the import and export media of commercial design tools. There are two types of uniform regions for structured files: ASCII and* ***binary regions****" where interfacing with such a structured binary file requires a binary file system).*

It would have been obvious to one of ordinary skill in the art to combine Balachander, Hazama, Jayaram, and Morgenstern in order to utilize the well-proven and efficient method of read and writing computer data where this format has wide spread compatibility and flexibility with many existing computer systems.

As per claim 60, Balachander teaches the claimed:

60. The method of claim 59 further comprising producing a parametric feature based three-dimensional model *(In figure 5.23 on pg. 55 and parameters listed for each isolated feature at the bottom of page 54 to the top of page 55).*

As per claims 61-63, Balachander teaches the claimed:

61. The method of claim 60 further comprising back projecting the three-dimensional model to obtain drawing views associated with a three-dimensional mode and

62. The method of claim 61 further comprising overlaying the drawing views on top of the two-dimensional drawing views and

63. The method of claim 62 further comprising comparing the views *(towards middle of pg. 18, "**We study the 2-D orthographic projections of the 3-D geometric entity.** We then choose **the view which contains the pattern** which would most likely indicate the presence of that entity. This is called the critical pattern for that entity. **We now search the remaining two orthographic views for characteristic patterns formed by the 3-D feature** in Question". Here, the comparing is achieved through searching the remaining two orthographic views. Further, the search can include overlaying in order to find the pattern of the entity through comparison).*

7. Claims 71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Balachander in view of Hazama et al. (US Patent 6212441, herein referred to as "Hazama") in further view of Jayaram et al. (US Patent 7,149,677 B2, herein referred to as "Jayaram") in further view of Ganesan et al. (NPL Doc," Intersecting features extraction from 2D orthographic projections").

As per claim 71, Balachander teaches the claimed:

71. The method of claim 58, wherein step (c) comprises:

receiving the corrected two-dimensional drawing *(By teaching of the "2-D Orthographic Views (DFX File)" in the first box of the flow chart on pg. 25 where this two dimensional drawing can be corrected before Balachander performs analysis of the views).*

Balachander does not explicitly teach the remaining claim limitations.

Ganesan teaches the claimed:

performing a subpart extraction of the corrected two dimensional drawing *(bottom of 1st col on page 865, "The object from which features are* ***to be extracted*** *is basically divided into three types of* ***subparts"****);*

performing a subpart matching of the corrected two dimensional drawing *(top of 2nd col on page 865, "If the isolated subparts are holes or pockets, they are sent to the feature identification system" and 2nd full paragraph in 2nd col on page 864, "The* ***feature blocks are matched*** *with the standard features to determine if they are standard features");*

extracting nested loops and circular loops *(bottom of 2nd col on page 865, "The object from which features are to be* ***extracted*** *... Isolated subparts correspond to* ***closed loops in each view that do not touch the outermost loop****" where this closed loop can be a loop nested in the outer loop)*

matching the nested loops and circular loops *(bottom of 2nd col on page 865, "Isolated subparts correspond to* ***closed loops****", top of 2nd col on page 865, "Firstly, all isolated subparts* ***are identified*** *and separated" where identification can include a matching process);*

producing matched feature loops *(towards middle of 1st col on page 868, "If the resultant* ***loop*** *is a standard feature,* ***extract and save it*** *separately").*

It would have been obvious to one of ordinary skill in the art to combine Balachander, Hazama, Jayaram, and Ganaesan in order to use feature loop extraction and matching to handle more complex shape analysis (towards bottom of 2nd col on page 865).

8. Claims 72 are rejected under 35 U.S.C. 103(a) as being unpatentable over Balachander in view of Hazama et al. (US Patent 6212441, herein referred to as "Hazama") in further view of Jayaram et al. (US Patent 7,149,677 B2, herein referred to as "Jayaram") in further view of Gadh et al. (US Patent 6,629,065).

As per claim 72, Balachander teaches the claimed:

Receiving the matched feature loops *(in figure 5.19 on page 47, where Loops 1-5 as shown have matching locations in each of the three views as shown, this interpretation of loop matching is similar to the definition given by applicant in the specification on the bottom of page 16 and top of page 17, which states "Feature detection is primarily performed as a two-step process - extraction of feature loops 173 from the 2D views and* <u>*matching these loops in all views*</u> *174"),*

Performing a profile analysis on each loop match *(towards top of pg. 48, "The next step is to find the hierarchical relationship between the loops as follows:" where according to figure 5.19 determining such a relationship involves analysis of each of profile views as shown),*

Building feature subtrees *(bottom of page 48, where a subtree is shown for Loops 1-3 and where figure 5.19 on page 47 shows these loops associated with features, and thus the tree is also a feature subtree),*

Setting a relative volume operation for each of the feature subtrees *(in figure 2.1 on page 9 where the relative volumes and their operations is shown as subtrees),*

Balachander does not explicitly teach the remaining claim limitations.

Gadh teaches the claimed:

Building feature relations on the feature subtrees *(in figure 19 where feature relations are built),*

Building a model tree based on the feature relations and

Producing a final feature tree based on the model tree to give the ordered list of three dimensional features *(in figure 20B where a final feature tree is built to give the ordered list of three dimensional features).*

It would have been obvious to one of ordinary skill in the art to combine Balachander, Hazama, Jayaram, and Gadh. Gadh offers one advantage to the combination *(in the abstract,*

"The underlying geometric representation of the objects within the design tool is optimized so that design activities such as modeling, editing, rendering, etc. can be processed extremely rapidly, thereby enhancing the response time of the design tool") where this rapid modeling and rendering can allow the user to correct any mistakes in real-time in a CAD model conversion process.

Response to Arguments

9. Applicant's arguments filed 2/12/2007 have been fully considered but they are not persuasive. Further, some arguments presented by the applicants are now moot in view of new grounds of rejection. Only the arguments that are not moot are addressed.

Applicant argues "2. Balachander does not teach the storage of feature data required to carry out the steps of the claimed subject matter" (bottom of page 11 and top of page 12 in filed response). The examiner respectfully maintains that the rejections are proper because Balachander teaches of a feature storage and a feature database *(in the chart on pg. 56 of geometric representations of individual feature types such as Channel, Step, and Open Pocket and top of page 26, "For every arc (semi-circle, quarter circle) in the entity database lines ... are generated and* ***stored in the line entity database****" where these geometry features are stored in a library or database" and page 54, section 5.4.5, "The Feature Database" where this database stores features).* Further applicant argues that "Balachander clearly shows that it does not store any data pertaining to the features in the 3-D domain other than elementary parameters such as height, length, and depth of the generic shapes". The examiner respectfully maintains Balachander teaches the claimed

limitations because the elementary parameters such as height, length, and depth of the generic shapes are features and fulfill the specific claim limitations as provided. This is because these features can communicate building information relating to the specific geometry. There is nothing relating to the feature storage explicitly cited in the claims which is missing from Balachander.

Applicant argues "3. Balachander does not teach the step of ordering the features" (page 12 in filed response).

The examiner respectfully maintains that the rejections are proper because Balachander teaches the claimed ordering of the features *(bottom of page 33, "The feature extraction from the root object is performed in a series of steps as shown in Fig 5.8. ... Then features are extracted from the primary loop of each view" and towards middle of pg. 49, "In order to classify the features as protrusions and depressions we consider the feature loops together with the enclosure relationships". Furthermore, pg. 49 shows a loop hierarchy).*

In this case, the enclosure relationships as cited by the reference imply there is at least some type of order present. Further, the loop hierarchy on page 49 has an order inherent in its structure where these loop hierarchies are directly related to the features as demonstrated on page 50 in figure 5.22. Further, Figure 2.1 (pg. 9) has an additional hierarchy showing build features for a given geometric data. Lastly, Balachander presents at least three views (orthographic), which is less than 6 views as the claim language requires.

Applicant argues "5. Balachander does not teach the geometry library and feature library claimed in Claims 6 and 7" (bottom of page 13 in filed response).

The examiner respectfully maintains that the rejections are proper because Balachander teaches a geometry library and feature library *(bottom of page 25, "The information about different entities like lines, arcs, and circles are stored in separate files", top of page 26, "For every arc (semi-circle, quarter circle) in the entity database lines ... are generated and stored in the line entity database" where these geometry features are stored in a library or database" and a feature library page 54, section 5.4.5, "The Feature Database" where the library can be the database adapted to build the three-dimensional model).* In this situation, entities such as lines, arcs, and circles, and shapes are part of the geometric library where the library is collection of these elements. Further, the recited feature database is a collection of features, which can also be a feature library because the plurality of features creates the library of features. Thus, Balachander teaches the claimed limitations.

Applicant argues "7. Balachander does not teach the feature extraction that is required to carry out the steps of Claims 11-13" (bottom of page 14 and top of page 15 in filed response).

The examiner respectfully maintains that the rejections are proper because Balachander teaches of defining the three-dimensional coordinate system (claim 11) *(page 35, towards top, "1. The line entity whose end-point has the least X, Y, or Z co-coordinates is chosen as the seed entity for tracing out the primary loop")* where these three coordinates would indicate three-dimensions are used for tracing a loop around a feature. Balachander teaches a work plane (claim 12) *(in figure 5.18 on page 46, where the tracing in Loop 3 is a face upon which a feature is to be built,*

for example figure 5.23 shows where a Cylinder is built upon the face in Loop 3 where this loop a plane on the geometry). Balachander teaches an elevation of the plane (claim 13)*(on fig 6.3 on page 64 shows the elevation of a plane where the cylinder rests on the "front View" and the "Side View" where the elevation is the fact that the plane is on top of the geometric shape and elevated from the bottom surface).*

Applicant argues "1. Balachander does not teach performing a profile analysis or producing an ordered list of features, as required by Claim 58" (page 18 in filed response).
The examiner respectfully maintains that the rejections are proper because Balachander teaches a profile analysis *(towards top of pg. 18, "The recognition of 3-D geometric entities like cones, spheres and parallelepipeds from 2-D orthographic views").* Further, figure 5.22 on page 50 shows that these 3-D geometric entities have feature loops associated with them. Further, figure 5.22 shows that these features loop have some matching locations for corresponding views (i.e. the top and side views). Thus, the recognition process of Balachander teaches the claimed limitations, the profile analysis is the analysis of each profile view in figure 5.22.

Applicant argues "2. Balachander does not teach the order resolution of features and cannot teach producing a parametric, feature-based 3-D model as required by Claim 60" (top of page 19 in filed response). The examiner respectfully maintains that the rejections are proper because Balachander teaches of parametric, three-dimensional features that are later used to create a model *(In figure 5.23 which shows the end result and on pg. 55 and parameters listed for each isolated feature at the bottom of page 54 to the top of page 55).* In this case, the parameters are

associated with the isolated features (i.e. the bottom of page 54), where the parameters are "Parallelepiped: Geometry – Sweep Base, Height, Class – Translational, and Type- Depression" where this parallelepiped feature is three-dimensional.

Applicant argues "3. Balachander does not teach model verification by back projecting the 3-D model and overlaying the drawing views on the 2-D drawing views, as Claims 61-63 require" (middle of page 19 in filed response).

The examiner respectfully maintains that the rejections are proper because Balachander teaches of back projecting *(towards middle of pg. 18, "We study the 2-D orthographic projections of the 3-D geometric entity. We then choose the view which contains the pattern which would most likely indicate the presence of that entity ... We now search the remaining two orthographic views for characteristic patterns formed by the 3-D feature in Question")*. In this situation, view projection is performed. Further, searching is performed in order to look for patterns in each of the other views. Thus, the overlaying is the projecting across multiple views looking for patterns to find features of the model.

Applicant argues "5. Balachander does not teach fixing a common origin, nor translating the entities as required by Claims 66-68" (page in filed response).

The examiner respectfully maintains that the rejections are proper because Balachander teaches the claimed limitations *(towards top of pg. 26, "The co-ordinates of the start and end points of the lines, arcs, and circles are normalized with respect to a common origin". Further, the chart on the top of pg. 56 shows root object features being organized into a translational class)*. In

this situation, the co-ordinates are normalized to a common origin. Thus, this process can involve fixing a common origin point. Further, moving any features with respect to the common origin point can be a translation of that feature.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel F. Hajnik whose telephone number is (571) 272-7642. The examiner can normally be reached on Mon-Fri (8:30A-5:00P).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka J. Chauhan can be reached on (571) 272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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D.H. 5/3/07

DFH

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PRIMARY EXAMINER